



Bryoflora of Dernekpazarı district of Trabzon (Turkey) province

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Abstract

The bryoflora of Dernekpazarı district of Trabzon province was researched between 2011 and 2012. A total of 95 bryophytes belonging to 63 genera (8 liverworts and 55 mosses) were determined from different localities. Of these, 12 taxa are liverworts and 83 taxa are mosses. The research area is located in the A4 grid-square in the system adopted by Henderson in 1961. 3 taxa (*Fissidens bryoides* Hedw., *Fissidens pusillus* (Wils.) Milde, and *Timmiella barbuloidea* (Brid.) Mönk.) were recorded as new records for A4 grid-square. *Trichocolea tomentella* (Ehrh.) Dumort. has also reported second time for Turkey in this paper. In addition, localities where taxa were collected and their substrata are presented.

Key words: Bryophytes, Trabzon province, Dernekpazarı, Turkey

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Trabzon ili Dernekpazarı ilçesinin briyofit florası

Özet

2011 ve 2012 yılları arasında, Trabzon ilinin Dernekpazarı ilçesinin briyofit florası araştırıldı. Farklı lokalitelerden 63 genusa (8 ciğerotu ve 55 yapraklı karayosunu) ait toplam 95 briyofit belirlendi. Bunlardan 12 tanesi ciğerotu ve 83 tanesi yapraklı karayosunudur. Araştırma alanı, 1961 yılında Henderson tarafından yapılan Türkiye kareleme sisteminde, A4 karesinde yer almaktadır. 3 takson (*Fissidens bryoides* Hedw., *Fissidens pusillus* (Wils.) Milde ve *Timmiella barbuloidea* (Brid.) Mönk.) A4 karesi için yeni olarak kaydedilmiştir. Ayrıca, *Trichocolea tomentella* (Ehrh.) Dumort bu makale ile Türkiye'den ikinci kez rapor edilmektedir. Bunun yanında, taksonların alındığı lokaliteler ve substratları da verilmiştir.

Anahtar kelimeler: Briyofitler, Trabzon ili, Dernekpazarı, Türkiye

1. Introduction

Additions to the bryophyte flora of Turkey in the last five years from the Eastern Black Sea region include: *Dicranodontium uncinatum* (Harv.) Jaeg. (Batan and Özdemir, 2008), *Rhytidiadelphus loreus* (Hedw.) Warnst. (Özdemir, 2008), *Didymodon asperifolius* (Mitt.) H.A.Crum, Steere & L.E.Anderson (Özdemir et al., 2008), *Campylopus flexuosus* (Hedw.) Brid. (Özdemir and Uyar, 2008), *Scapania paludosa* (Müll. Frib.) Müll. Frib. (Keçeli et al., 2008), *Dicranum flexicaule* Brid. (Uyar et al., 2008), *Sphagnum centrale* C.E.O.Jensen (Abay et al., 2009), *Orthotrichum callistomum* Fisch. Oost. ex Bruch & Schimp., *O. consobrinum* Cardot, *O. crenulatum* Mitt., *O. hispanicum* F.Lara, Garilleti & Mazimpaka, *O. rogeri* Brid., *O. sordidum* Sull. & Lesq., *O. stellatum* Brid., *O. vladikvkanun* Venturi, *Ulota coarctata* (Palisot de Beauvois) Hammar, *U. rehmannii* Jur. and *Zygodon dentatus* (Breidl. ex Limpr.) Kartt. (Lara et al., 2010), *Seligeria trifaria* (Brid.) Lindb., and *Pseudotaxiphyllum elegans* (Brid.) Z.Iwats. (Ören et al., 2012), *Dicranella schreberiana* (Hedw.) Dixon, *Dicranodontium asperulum* (Mitt.) Broth., and *Campylopus pyriformis* (Schultz) Brid.] (Batan and Özdemir, 2013); *Sphagnum contortum*, Schultz *S. fallax* (Klinggr.)

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Klinggr., *S. magellanicum* Brid. and *S. rubellum* Wilson (Kırmacı and Kürschner, 2013), *Dicranella schreberiana* (Hedw.) Dixon, *Dicranodontium asperulum* (Mitt.) Broth., and *Campylopus pyriformis* (Schultz) Brid. (Batan and Özdemir, 2013), *Leptoscyphus cuneifolius* (Hook.) (Batan et al. 2013). The aim of the present study was to contribute to the moss flora of Trabzon Province (Dernekpazarı districts) and the moss flora of Turkey.

Dernekpazarı is situated in the Euro-Siberian floristic region, and is located in the A4 square of Turkey according to the grid system of Henderson (Henderson, 1961). The study area is in Trabzon province in the Black Sea region of Turkey between 40° 47' N and 40° 19' E. It is surrounded by Of district to the North, Çaykara to the South, Köprübaşı to the West and Hayrat to the East. The East Black Sea Mountain range belongs to the North Anatolia of Turkey. The eastern part the range is high, continuous and lies close to the Black Sea. On the North side of the mountains the rivers cut deep gorges flowing down to the sea. Thans to the moist climate, this area supports the largest tracks of closed forest in Turkey. The research area, has a typical oceanic climate. There is no drought season in this climate type and annual precipitation is 2350 mm. The mean yearly temperature is 18.5 °C, the coldest month is January with 6 °C, and the warmest is July with 24 °C average temperature (Papp, 2004).

The northern slope of the East Black Sea Mountain range are covered by mixed forests dominated by *Alnus glutinosa* (L.) Gaertn., *Fagus orientalis* Lipsky, *Picea orientalis* (L.) Link., *Rhododendron ponticum* L., *R. luteum* Sweet., *Corylus avellana* L., *Laurus nobilis* L., *Buxus sempervirens* L., *Daphne pontica* L., *Ilex colchica* Pojk., *Castanea sativa* Mill., *Carpinus betulus* L., *Tilia rubra* DC, *Equisetum arvense* L., *Diospyros lotus* L., *Vaccinium arctostaphylos* L., *Vaccinium myrtillus* L., *Juglans regia* L., *Ficus carica* L. *Cydonia oblonga* Miller (Papp, 2004 and Sağıroğlu et al., 2012). Dernekpazarı is dominated by the East Black Sea region climate in general.

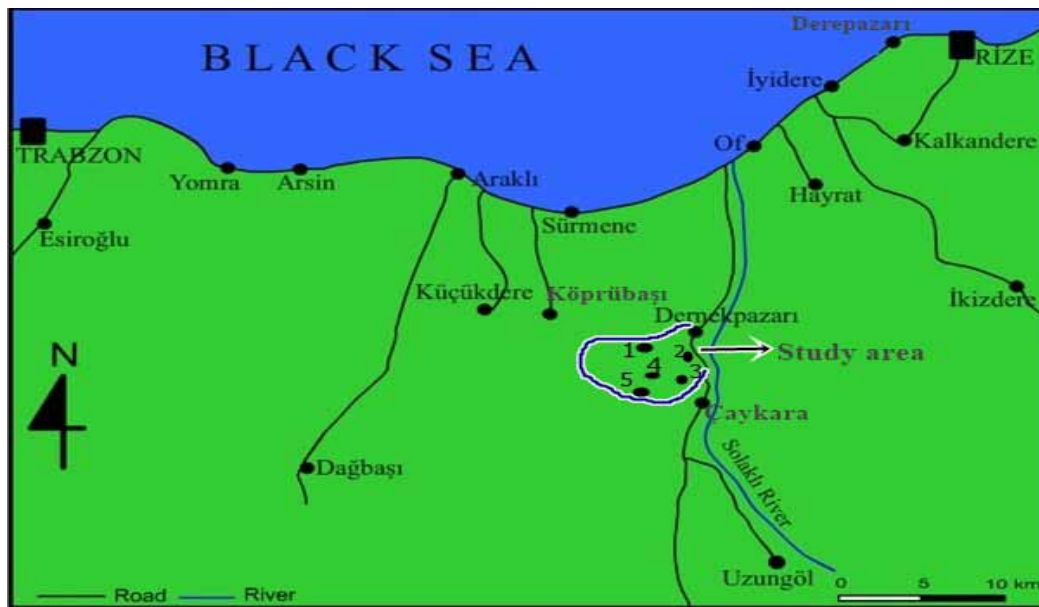


Figure 1. Geographic location of study area: 1. YeniceVillage; 2. Tüfekçi Village; 3. Ormancık Village; 4. Çalışanlar Village; 5 Taşçılar Village

2. Materials and methods

The bryophte samples were collected between 07.02.2011 and 11.10.2012 in Dernekpazarı. Air-dried samples were examined with Carl Zeiss Stemi 2000-C stereomicroscope and Carl Zeiss Axio Imager A2 light microscope. The following references were used for identification and nomenclature of bryophytes: (Lewinsky, 1993; Smith, 2004; Paton, 1999; Cortini Pedrotti, 2001, 2006; Greven, 2003; Heyn and Herrnstadt, 2004; Frey et al., 2006; Guerra et al., 2006; Guerra and Cros, 2007 and Kürschner and Frey, 2011). In addition, the new records for A4 grid-square and Turkey were determined by reviewing the related literature (Özdemir, 2008; Hazer, 2012; Batan and Özdemir, 2013).

For each taxon, localities and substrate were given to avoid repetition in the floristic list, The taxa recorded from Turkey for the second time are indicated with (*) and new records for A4 square are indicated with (#), which presented in the bryofloristic list.

2.1. The stations of collected specimens

1. A4 grid-square, Trabzon province, Dernekpazarı district, YeniceVillage 1, 40° 47' 15.76" N, 40° 12' 16.81" E, 483 m a.s.l., 07.02.2011.
2. A4 grid-square, Trabzon province, Dernekpazarı district, Yenice Village 2, 40° 47' 18.48" N, 40° 13' 03.18" E, 487 m a.s.l., 07.02.2011.

3. A4 grid-square, Trabzon province, Dernekpazarı district, Çalışanlar Village 1, 40° 46' 53.79" N, 40° 13' 08.37" E, 492 m a.s.l., 25.03.2012.
4. A4 grid-square, Trabzon province, Dernekpazarı district, Çalışanlar Village 2, 40° 46' 31.11" N, 40° 13' 05.63" E, 368 m a.s.l., 25.03.2012.
5. A4 grid-square, Trabzon province, Dernekpazarı district, Tüfekçi Village, 40° 47' 08.21" N, 40° 14' 00.31" E, 334 m a.s.l., 15.04.2012.
6. A4 grid square, Trabzon province, Dernekpazarı district, Ormançık Village, 40° 46' 23.63" N, 40° 13' 06.06" E, 415 m a.s.l. , 11.10.2012.
7. A4 grid-square, Trabzon province, Dernekpazarı district, Taşçılar Village, 40° 46' 14.05" N, 40° 12' 26.47" E, 539 m a.s.l., 11.10.2012.
8. A4 grid-square, Trabzon province, Dernekpazarı district, 40° 47' 20.66" N, 40° 14' 17.19" E, 268 m a.s.l., 11.10.2012.

For the each taxon found in the Dernekpazarı, information on the district zones where it occurred, and about the habitat where it grew, is given. Liverworts and mosses are listed separately and alphabetically. Vouchers are deposited in the Biology Department, Faculty of Science, Karadeniz Technical University, Turkey (KTUB). Abbreviations in the floristic list: Station no: (1, 2, 3, ...), (S): on soil, (R): on rock, (SM): submerged, (TB): on tree body, (WS): on wet soil, (WR): on wet rock and (NS): near stream.

3. Results

The Bryofloristic List

3.1. Liverworts (Marchantiophyta)

1. *Conocephalum conicum* (L.) Dumort. – 1, 2, 7, WR, NS, BATAN 2170.
2. *Frullania dilatata* (L.) Dumort. – 1, TB, BATAN 2171.
3. *Lophocolea bidentata* (L.) Dumort. – 6, 8, WS, NS, BATAN 2172.
4. *L. heterophylla* (Schrad.) Dumort. – 2, 7, WS, NS, BATAN 2173.
5. *L. minor* Nees – 1, 2, WS, BATAN 2174.
6. *Metzgeria conjugata* Lindb. – 7, WS, NS, BATAN 2175.
7. *M. furcata* (L.) Dumort. – 2, 5, 7, WS, NS, BATAN 2176.
8. *Porella platyphylla* (L.) Pfeiff., – 5, 6, TB, BATAN 2177.
9. *Radula complanata* (L.) Dumort. – 2, 5, TB, BATAN 2178.
10. *R. lindenberiana* Gottsche ex C.Hartm., – 1, 2, WS, BATAN 2179.
11. *Riccardia chamedryfolia* (With.) Grolle – 4, 6, WS, NS, BATAN 2180.
- *12. *Trichocolea tomentella* (Ehrh.) Dumort. – 1, WS, NS, BATAN 2181.

3.2. Mosses (Bryophyta)

13. *Amblystegium confervoides* (Brid.) Schimp.– 4, SM, WR, NS, BATAN 2182.
14. *A. serpens* (Hedw.) Schimp., – 1, 2, 3, 4, 6, 8, WS, NS, BATAN 2183.
15. *Anomodon attenuatus* (Hedw.) Huebener – 1, 5, 8, R, BATAN 2184.
16. *A. viticulosus* (Hedw.) Hook. & Taylor – 3, 8, R, BATAN 2185.
17. *Antitrichia curtipendula* (Hedw.) Brid. – 8, TB, BATAN 2186.
18. *Atrichum undulatum* (Hedwig) P. Beauvois – 1, 3, 6, 8, WS, BATAN 2187.
19. *Barbula unguiculata* Hedw. – 7, WS, BATAN 2188.
20. *Brachythecium salebrosum* (Weber & D. Mohr) Bruch & Schimp. – 6, TB, BATAN 2189.
21. *Bryum alpinum* Huds. ex With., – 2, 4, WS, BATAN 2190.
22. *B. argenteum* Hedw. – 5, S, BATAN 2191.
23. *B. capillare* Hedw. – 1, 2, 5, 8, S, BATAN 2192.
24. *Calliargonella cuspidata* (Hedw.) Loeske – 1, 3, 4, 6, 7, SM, S, BATAN 2193.

25. *Campyliadelphus chrysophyllus* (Brid.) R. S. Chopra – 4, NS, WS, BATAN 2194.
26. *Campylopus atrovirens* De Not. – 4, WR, BATAN 2195.
27. *Ceratodon purpureus* (Hedw.) Brid. – 1, S, BATAN 2196.
28. *Climacium dendroides* (Hedw.) F. Weber & D. Mohr – 3, 5, 7, S, BATAN 2197.
29. *Cratoneuron filicinum* (Hedw.) Spruce, – 5, SM, BATAN 2198.
30. *Ctenidium molluscum* (Hedw.) Mitt. – 5, WS, BATAN 2199.
31. *Dicranella heteromalla* (Hedw.) Schimp. – 2, 5, 8, WS, BATAN 2200.
32. *Dicranodontium denudatum* (Brid.) E. Brit. – 1, TB, BATAN 2201.
33. *Dicranum fulvum* Hook. – 3, S, BATAN 2202.
34. *D. scoparium* Hedw., – 1, 2, 3, 4, 5, 7, 8, S, BATAN 2203.
35. *D. tauricum* Sapjegin – 7, 8, TB, BATAN 2204.
36. *D. viride* (Sull. & Lesq.) Lindb. – 6, TB, BATAN 2205.
37. *Diphyscium foliosum* (Hedw.) D.Mohr – 6, WS, BATAN 2206.
38. *Distichium capillaceum* (Hedwig) Bruch & Schimper – 1, S, BATAN 2207.
39. *Encalypta streptocarpa* Hedw. – 4, 6, 8, S, BATAN 2208.
40. *E. vulgaris* Hedw., – 4, 7, S, BATAN 2209.
41. *Entosthodon attenuatus* (Dicks.) Bryhn, – 3, S, BATAN 2210.
42. *Eurhynchium angustirete* (Broth.) T.J.Kop. – 4, S, BATAN 2211.
43. *E. striatum* (Hedw.) Schimp. – 1, 2, 3, 4, 7, S, BATAN 2212.
44. *Fissidens taxifolius* Hedw. – 1, WS, NS, BATAN 2213.
45. *F. adianthoides* Hedw. – 7, WS, NS, BATAN 2214.
- #46. *F. bryoides* Hedw. – 1, WS, BATAN 2215.
47. *F. dubius* P.Beauv. – 8, WS, NS, BATAN 2216.
- #48. *F. pusillus* (Wils.) Milde – 1, WS, BATAN 2217.
49. *F. viridulus* (Sw.) Wahlenb. – 1, WS, BATAN 2218.
50. *Funaria hygrometrica* Hedw., – 3, 4, 6, S, BATAN 2219.
51. *Homalothecium lutescens* (Hedw.) H.Rob. – 1, 2, 3, 4, 5, 6, 7, 8, S, BATAN 2220.

52. *H. sericeum* (Hedw.) Schimp. – 1, 2, 4, 5, 7, 8, R, BATAN 2221.
53. *Hygroamblystegium humile* (P. Beauv.) Vand., Gof. & Hed. – 5, WS, NS, BATAN 2222.
54. *H. varium* (Hedw.) Mönk. – 4, 8, WS, NS, BATAN 2223.
55. *Hygrohypnum luridum* (Schimp.) Broth. – 3, SM, WR, BATAN 2224.
56. *Hypnum andoi* A.J.E.Sm. – 5, TB, BATAN 2225.
57. *H. cupressiforme* var. *cupressiforme* Hedw. – 1, 2, 3, 4, 5, 6, 7, 8, TB, BATAN 2226.
58. *H. cupressiforme* var. *resupinatum* (Taylor) Schimp. – 2, 3, 5, 6, TB, BATAN 2227.
59. *Isoetecium alopecuroides* (Dubois) Isov. – 3, 6, 7, TB, BATAN 2228.
60. *I. myosuroides* Brid. – 1, 4, 5, 8, TB, BATAN 2229.
61. *Leucobryum glaucum* (Hedw.) Angstr. – 2, 5, 6, S, BATAN 2230.
62. *Leucodon sciurooides* Schwager – 1, TB, BATAN 2231.
63. *Mnium spinulosum* Bruch & Schimp. – 1, S, BATAN 2232.
64. *Neckera crispa* Hedw. – 3, 4, 6, 8, R, BATAN 2233.
65. *Oncophorus virens* (Hedw.) Brid. – 3, S, BATAN 2234.
66. *Orthotrichum affine* Schrad. ex Brid. – 6, 7, 8, TB, BATAN 2235.
67. *O. anomalum* Hedw. – 2, 4, 7, TB, BATAN 2236.
68. *O. rupestre* Schleich. ex Schwäger. – 8, TB, BATAN 2237.
69. *Philonotis arnellii* Husn. – 1, SM, BATAN 2238.
70. *Plagiomnium cuspidatum* (Hedw.) T. Kop. – 1, 3, 4, 5, 7, WS, BATAN 2239.
71. *P. undulatum* (Hedw.) T. Kop. – 1, 3, 4, 5, 7, WS, BATAN 2240.
72. *Plagiothecium curvifolium* Schlieph. ex Limpr. – 6, WS, NS, BATAN 2141.
73. *P. latebricola* Schimp. – 6, WS, NS, BATAN 2142.
74. *Plamocladium euchloron* (C. Mull.) Wijk et Marg. – 8, R, BATAN 2143.
75. *Plasturhynchium striatulum* (Spruce) M. Fleisch. – 6, S, BATAN 2144.
76. *Platyhypnidium riparioides* (Hedw.) Dixon – 1, 2, 7, SM, R, BATAN 2145.
77. *Pseudoscleropodium purum* (Hedw.) M.Fleisch. – 1, 3, 4, 5, 7, S, BATAN 2246.
78. *Pterigynandrum filiforme* Hedw. – 5, TB, BATAN 2247.
79. *Pterogonium gracile* (Hedw.) Sm. – 5, TB, BATAN 2248.
80. *Rhizomnium punctatum* (Bruch & Schimp.) T.J.Kop. – 3, 8, WS, BATAN 2249.
81. *Rhodobryum ontariense* (Kindb.) Kindb. – 7, WS, NS, BATAN 2250.
82. *R. roseum* (Hedw.) Limpr., – 1, 4, S, BATAN 2251.
83. *Rhytidadelphus triquetrus* (Hedw.) Warnst. – 3, 4, 7, S, BATAN 2252.
84. *Sanionia uncinata* (Hedw.) Loeske – 5, 7, 8, TB, BATAN 2253.
85. *Schistidium papillosum* Culm. – 6, WR, BATAN 2254.
86. *S. strictum* (Turn.) Loeske ex Mart. – 2, R, BATAN 2255.
87. *S. trichodon* (Brid.) Poelt – 7, WR, BATAN 2256.
88. *Tetraphis pellucida* Hedw. – 6, TB, BATAN 2257.
89. *Thamnobryum alopecurum* (Hedw.) Gangulee – 4, 6, S, BATAN 2258.
90. *Thuidium delicatulum* (Hedw.) Schimp. – 1, 2, 3, 5, 7, 8, S, BATAN 2259.
- #91. *Timmiella barbulooides* (Brid.) Mönk. – 4, R, BATAN 2260.
92. *Tortella humilis* (Hedw.) Jenn., – 1, WS, NS, BATAN 2261.
93. *T. inclinata* var. *densa* (Lorentz & Molendo) Limpr. – 4, S, BATAN 2262.
94. *T. Tortuosa* (Hedw.) Limpr. – 1, 2, 3, 5, 7, 8, S, BATAN 2263.
95. *Ulota crispa* (Hedw.) Brid. – 2, 5, 8, TB, BATAN 2264.

4. Results and discussion

In this study, the collected bryophytes were evaluated and 95 taxa (species, subspecies and varieties) belonging to 63 genera were determined. Among them, *Trichocolea tomentella* second time recorded from Turkey. It was recorded firstly from Findıklı district of Rize province by Keçeli and Abay (2012). According to the system of Henderson (1961) 3 taxa (*Fissidens bryoides* *F. pusillus*, and *Timmiella barbulooides*) new records for A4 square.

The 22 taxa are epiphytic (TB) (19 mosses and 3 liverworts), 13 taxa saxicolous (R and WR) (12 mosses and 1 liverwort) and 55 taxa terricolous (S and WS) (47 mosses and 8 liverworts). As a result, Bryophytes taxa were seen to grow mostly on soil in Dernekpazarı district of Trabzon province. Saxicolous taxa were very few, because, research area is usually covered by forest.

The most common genera of bryophytes are *Fissidens* (6 taxa), *Dicranum* (4 taxa), *Lophocolea* (3 taxa), *Bryum* (3 taxa), *Schistidium* (3 taxa) *Hypnum* (3 taxa), *Orthotrichum* (3 taxa) and *Tortella* (3 taxa) in the area. The most common species, subspecies and varieties of bryophytes are *Amblystegium serpens*, *Atrichum undulatum*, *Bryum capillare*, *Calliergonella cuspidata*, *Dicranum scoparium*, *Eurhynchium striatum*, *Homalothecium lutescens*, *Homalothecium sericeum*, *Hypnum cupressiforme* var. *cupressiforme*, *Hypnum cupressiforme* var. *resupinatum*, *Isoetecium myosuroides*, *Neckera crispa*, *Plagiomnium cuspidatum*, *Plagiomnium undulatum*, *Pseudoscleropodium purum*, *Thuidium delicatulum*, *Tortella tortuosa*.

Trichocolea tomentella usually grows in moist, especially in deciduous forest, often near streams (Rydgren et al., 2012). It has been observed both in Rize (Findıklı) and Trabzon (Dernekpazarı) north east of Black Sea Region in Turkey. *T. tomentella* grows in *Alnus glutinosa*, *Rhododendron ponticum* L., *R. luteum* Sweet., *Corylus avellana* L. Mixed forests dominated by *Alnus glutinosa*, *Rhododendron ponticum* L., *R. luteum* Sweet., and fern dominated sites. In addition *T. tomentella* associated with *Calliergonella cuspidata*, *Plagiomnium cuspidatum*, *P. undulatum* and *Thuidium delicatulum* in study area.

Trabzon is relatively rich in bryophyte flora. Compared to the other bryologically characterized cities of Turkey, it is among the richest and significantly richer than other cities of bryophyte floras. Although a lot of studies were done so far, new records are still being discovered (*Fissidens bryoides* Hedw., *Fissidens pusillus* (Wils.) Milde, and *Timmiella barbulooides* (Brid.) Mönk.) from Trabzon, located in the A4 square in the grid system adopted by Henderson (1961). This is due to the wet and mild climate and many micro-habitats and different ecological situations present within the region. Up to now, *Fissidens bryoides* known from Turkey (A1, A2, B6, C11 and C13 squares), *Fissidens pusillus* known from Turkey (A1, B6, and C11 squares) and *Timmiella barbulooides* known from Turkey (B6, C11, C12 and C13 squares). These species first time reported from A4 square with this paper.

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